

#### SEQUENCE LISTING

## (1) GENERAL INFORMATION:

(i) APPLICANT: IMMER, Hansueli

FORSSMANN, Wolf-Georg

ADERMANN, Knut KLESSEN, Christian

- (ii) TITLE OF INVENTION: PROCESS AND INTERMEDIATE PRODUCTS FOR PREPARING CARDIODILATIN FRAGMENTS AND HIGHLY PURIFIED CARDIODILATIN FRAGMENTS
  - (iii) NUMBER OF SEQUENCES: 11
  - (iv) CORRESPONDENCE ADDRESS:
    - (A) ADDRESSEE: Nikaido, Marmelstein, Murray & Oram
    - (B) STREET: 655 Fifteenth Street, N.W., Suite 330
    - (C) CITY: Washington
    - (D) STATE: D.C.
    - (E) COUNTRY: USA
    - (F) ZIP: 20005-4810
    - (v) COMPUTER READABLE FORM:
      - (A) MEDIUM TYPE: Floppy disk
      - (B) COMPUTER: IBM PC compatible
      - (C) OPERATING SYSTEM: PC-DOS/MS-DOS
      - (D) SOFTWARE: PatentIn Release #1.0, Version #1.30
  - (vi) CURRENT APPLICATION DATA:
    - (A) APPLICATION NUMBER: US 09/027,777
    - (B) FILING DATE: 23-FEB-1998
    - (C) CLASSIFICATION:
  - (vii) PRIOR APPLICATION DATA:
    - (A) APPLICATION NUMBER: DE 44 20 381.0
    - (B) FILING DATE: 02-JUN-1994
  - (vii) PRIOR APPLICATION DATA:
    - (A) APPLICATION NUMBER: DE 195 13 784.1
    - (B) FILING DATE: 10-APR-1995
  - (viii) ATTORNEY/AGENT INFORMATION:
    - (A) NAME: Kitts, Monica C.
    - (B) REGISTRATION NUMBER: 36,105
    - (C) REFERENCE/DOCKET NUMBER: P1614-8019
    - (ix) TELECOMMUNICATION INFORMATION:
      - (A) TELEPHONE: (202) 638-5000
      - (B) TELEFAX: (202) 368-4810
- (2) INFORMATION FOR SEQ ID NO:1:
  - (i) SEQUENCE CHARACTERISTICS:
    - (A) LENGTH: 17 amino acids



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(C) STRANDEDNESS:
           (D) TOPOLOGY: linear
     (ii) MOLECULE TYPE: peptide
     (xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:
      Cys Phe Gly Gly Arg Met Asp Arg Ile Gly Ala Gln Ser Gly Leu Gly
      Cys
 (2) INFORMATION FOR SEQ ID NO:2:
      (i) SEQUENCE CHARACTERISTICS:
           (A) LENGTH: 15 amino acids
           (B) TYPE: amino acid
           (C) STRANDEDNESS:
           (D) TOPOLOGY: linear
     (ii) MOLECULE TYPE: peptide
     (xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:
      Leu Arg Ala Leu Leu Thr Ala Pro Arg Ser Leu Arg Arg Ser Ser
                                           10
(2) INFORMATION FOR SEQ ID NO:3:
      (i) SEQUENCE CHARACTERISTICS:
           (A) LENGTH: 5 amino acids
           (B) TYPE: amino acid
           (C) STRANDEDNESS:
           (D) TOPOLOGY: linear
     (ii) MOLECULE TYPE: peptide
     (xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:
      Asn Ser Phe Arg Tyr
                      5
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(B) TYPE: amino acid.

(2) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 37 amino acids

- (B) TYPE: amino acid .
- (C) STRANDEDNESS:
- (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (ix) FEATURE:
  - (A) NAME/KEY: Peptide
  - (B) LOCATION: 1..15
- (D) OTHER INFORMATION: /note= "Xaa chain is an amino acid chain of 0 15 amino acids."
  - (ix) FEATURE:
    - (A) NAME/KEY: Peptide
    - (B) LOCATION: 33..37
- (D) OTHER INFORMATION: /note= "Xaa chain is an amino acid chain of  $0\,$   $5\,$  amino acids."
  - (ix) FEATURE:
    - (A) NAME/KEY: Cross-links
    - (B) LOCATION: 16..32
  - (xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

Phe Gly Gly Arg Met Asp Arg Ile Gly Ala Gln Ser Gly Leu Gly Cys 20 25 30

Xaa Xaa Xaa Xaa 35

- (2) INFORMATION FOR SEQ ID NO:5:
  - (i) SEQUENCE CHARACTERISTICS:
    - (A) LENGTH: 32 amino acids
    - (B) TYPE: amino acid
    - (C) STRANDEDNESS:
    - (D) TOPOLOGY: linear
  - (ii) MOLECULE TYPE: peptide
  - (ix) FEATURE:
    - (A) NAME/KEY: Cross-links
    - (B) LOCATION: 11..27
  - (xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

Thr Ala Pro Arg Ser Leu Arg Arg Ser Ser Cys Phe Gly Gly Arg Met
1 5 10 15

Asp Arg Ile Gly Ala Gln Ser Gly Leu Gly Cys Asn Ser Phe Arg Tyr



20 25 30

## (2) INFORMATION FOR SEQ ID NO:6:

- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 14 amino acids
  - (B) TYPE: amino acid
  - (C) STRANDEDNESS:
  - (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide

## (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 1
- (D) OTHER INFORMATION: /product= "Modified by a Boc protecting group and a tBu protecting group"

#### (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 4
- (D) OTHER INFORMATION: /note= "Modified by a tBu protecting group and a Pbf protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 5
- (D) OTHER INFORMATION: /note= "Modified by a tBu protecting group"

## (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 7
- (D) OTHER INFORMATION: /note = "Modified by a Pbf protecting

🦳 group"

## (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 8
- (D) OTHER INFORMATION: /note= "Modified by a Pbf protecting group"

# (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 9
- (D) OTHER INFORMATION: /note = "Modified by a tBu protecting group"

### (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 10
- (D) OTHER INFORMATION: /note= "Modified by a tBu protecting group"
  - (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 11
- (D) OTHER INFORMATION: /note= "Modified by a Acm protecting group"
  - (xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

Thr Ala Pro Arg Ser Leu Arg Arg Ser Ser Cys Phe Gly Gly
1 5 10

- (2) INFORMATION FOR SEQ ID NO:7:
  - (i) SEQUENCE CHARACTERISTICS:
    - (A) LENGTH: 12 amino acids
    - (B) TYPE: amino acid
    - (C) STRANDEDNESS:
    - (D) TOPOLOGY: linear
  - (ii) MOLECULE TYPE: peptide
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 1
- (D) OTHER INFORMATION: /product= "Modified by a Fmoc protecting group and a Pbf protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 3
- (D) OTHER INFORMATION: /product= "Modified by a OtBu protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 4
- (D) OTHER INFORMATION: /product= "Modified by a Pbf protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 8
- (D) OTHER INFORMATION: /product= "Modified by a Trt protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 9
- (D) OTHER INFORMATION: /product= "Modified by a tBu protecting group"
  - (xi) SEQUENCE DESCRIPTION: SEQ ID NO:7:

Arg Met Asp Arg Ile Gly Ala Gln Ser Gly Leu Gly
1 5 10



- (2) INFORMATION FOR SEQ ID NO:8:
  - (i) SEQUENCE CHARACTERISTICS:
    - (A) LENGTH: 6 amino acids
    - (B) TYPE: amino acid
    - (C) STRANDEDNESS:
    - (D) TOPOLOGY: linear
  - (ii) MOLECULE TYPE: peptide
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 1
- (D) OTHER INFORMATION: /note= "Modified by an Fmoc protecting group or  $\mbox{H"}$ 
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 1
- (D) OTHER INFORMATION: /product = "Modified by a Trt protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 2
- (D) OTHER INFORMATION: /product = "Modified by a Trt protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 3
- (D) OTHER INFORMATION: /product= "Modified by a tBu protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 5
- (D) OTHER INFORMATION: /product= "Modified by a Pbf protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 6
- (D) OTHER INFORMATION: /product= "Modified by a tBu protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 6
- (D) OTHER INFORMATION: /note= "Modified by an O-OH or an O-OtBu protecting group"
  - (xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:



Cys Asn Ser Phe Arg Tyr 1 5 .

- (2) INFORMATION FOR SEQ ID NO:9:
  - (i) SEQUENCE CHARACTERISTICS:
    - (A) LENGTH: 18 amino acids
    - (B) TYPE: amino acid
    - (C) STRANDEDNESS:
    - (D) TOPOLOGY: linear
  - (ii) MOLECULE TYPE: peptide
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 1
- (D) OTHER INFORMATION: /note= "Modified by an H or an Fmoc protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 1
- (D) OTHER INFORMATION: /product = "Modified by a Pbf protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 3
- (D) OTHER INFORMATION: /product= "Modified by a OtBu protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 4
- (D) OTHER INFORMATION: /product= "Modified by a Pbf protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 8
- (D) OTHER INFORMATION: /product= "Modified by a Trt protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 9
- (D) OTHER INFORMATION: /product= "Modified by a tBu protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 13
- (D) OTHER INFORMATION: /product= "Modified by a Trt protecting group"
  - (ix) FEATURE:



- (A) NAME/KEY: Modified-site
- (B) LOCATION: 14
- (D) OTHER INFORMATION: /product= "Modified by a Trt protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 15
- (D) OTHER INFORMATION: /product= "Modified by a tBu protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 17
- (D) OTHER INFORMATION: /product= "Modified by a Pbf protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 18
- (D) OTHER INFORMATION: /product= "Modified by a tBu protecting group and an OtBu protecting group"
  - (xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

Arg Met Asp Arg Ile Gly Ala Gln Ser Gly Leu Gly Cys Asn Ser Phe 1 5 10 15

Arg Tyr

(2) INFORMATION FOR SEQ ID NO:10:

- ~
- (i) SEQUENCE CHARACTERISTICS:
  - (A) LENGTH: 32 amino acids
  - (B) TYPE: amino acid
  - (C) STRANDEDNESS:
  - (D) TOPOLOGY: linear
- (ii) MOLECULE TYPE: peptide
- (ix) FEATURE:
  - (A) NAME/KEY: Modified-site
  - (B) LOCATION: 1
- (D) OTHER INFORMATION: /product= "Modified by a Boc protecting group and a tBu protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 4
- (D) OTHER INFORMATION: /product= "Modified by a Pbf protecting .group"
  - (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 5.
- (D) OTHER INFORMATION: /product= "Modified by a tBu protecting group"

#### (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 7
- (D) OTHER INFORMATION: /product= "Modified by a Pbf protecting group"

## (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 8
- (D) OTHER INFORMATION: /product= "Modified by a Pbf protecting group"

#### (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 9
- (D) OTHER INFORMATION: /product= "Modified by a Bu protecting group"

#### (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 10
- (D) OTHER INFORMATION: /product= "Modified by a tBu protecting

group"

# (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 11
- (D) OTHER INFORMATION: /product= "Modified by a Acm protecting group"

### (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 15
- (D) OTHER INFORMATION: /product = "Modified by a Pbf protecting group"

## (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 17
- (D) OTHER INFORMATION: /product= "Modified by a OtBu protecting group"

# (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 18
- (D) OTHER INFORMATION: /product= "Modified by a Pbf protecting group"

# (ix) FEATURE:

- (A) NAME/KEY: Modified-site
- (B) LOCATION: 22
- (D) OTHER INFORMATION: /product= "Modified by a Trt protecting

Z/X

group"

- (ix) FEATURE:
  - (A) NAME/KEY: Modified-site
  - (B) LOCATION: 23
- (D) OTHER INFORMATION: /product= "Modified by a tBu protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 27
- (D) OTHER INFORMATION: /product= "Modified by a Trt protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 28
- (D) OTHER INFORMATION: /product= "Modified by a Trt protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 29
- (D) OTHER INFORMATION: /product= "Modified by a tBu protecting group"
  - (ix) FEATURE:
    - (A) NAME/KEY: Modified-site
    - (B) LOCATION: 31
    - (D) OTHER INFORMATION: /product= "Modified by a Pbf protecting

✓ group"

- (ix) FEATURE:
  - (A) NAME/KEY: Modified-site
  - (B) LOCATION: 32
- (D) OTHER INFORMATION: /product= "Modified by a tBu protecting group and an OtBu protecting group"
  - (xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

Thr Ala Pro Arg Ser Leu Arg Arg Ser Ser Cys Phe Gly Gly Arg Met 1 5 10 15

Asp Arg Ile Gly Ala Gln Ser Gly Leu Gly Cys Asn Ser Phe Arg Tyr
20 25 30

- (2) INFORMATION FOR SEQ ID NO:11:
  - (i) SEQUENCE CHARACTERISTICS:
    - (A) LENGTH: 32 amino acids
    - (B) TYPE: amino acid
    - (C) STRANDEDNESS:
    - (D) TOPOLOGY: linear
  - (ii) MOLECULE TYPE: peptide

- (ix) FEATURE:
  - (A) NAME/KEY: Modified-site
  - (B) LOCATION: 11
- (D) OTHER INFORMATION: /product= "Modified by a Acm protecting group"
  - (xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

Thr Ala Pro Arg Ser Leu Arg Arg Ser Ser Cys Phe Gly Gly Arg Met  $1 \hspace{1.5cm} 5 \hspace{1.5cm} 10 \hspace{1.5cm} 15$ 

Asp Arg Ile Gly Ala Gln Ser Gly Leu Gly Cys Asn Ser Phe Arg Thr 20 25 30